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Naval Wireless Telegraphy on the Pacific Coast.

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It was in 1887 that Hertz published the results of his experiments showing the true wave action of the oscillatory discharge of an electric capacity. In later experiments he demonstrated that these waves have a well defined period of oscillation depending on the properties of the capacities discharged and the discharging circuit, proving, also, that their velocity is the same as heat and light waves and like them they are capable of refraction and reflection. In 1896 it was announced that Marconi by means of these electric waves had succeeded in a practical way in sending messages from one station to another without the use of wire or any other form of conductor. In the ten years that have followed the art of wireless telegraphy has progressed with rapid strides.

It was early recognized that the greatest application of the new art would be between ships at sea and between ship and shore, and between isolated points where the cost and difficulties made cable or wire connections impossible. As regards the use of wireless telegraphy at sea the Admiralties of all progressive nations saw the immense advantages it promised to give in the employment of fleets and ships both by a central authority on shore and by admirals of fleets and commanding officers of ships at sea. Wireless apparatus was very early installed on the ships of European Navies. Our own Navy Department was not blind to the advent of this new method of signaling, but decided for a time to take no active steps, meanwhile having agents abroad to watch the rapid changes and improvements and sending officers and men abroad to study the art and familiarize themselves with certain leading systems.

About the close of 1902, after having purchased four sets of different foreign systems for tests, and inviting the participation of other and especially American systems, experiments were begun between Annapolis, Md., and Washington, D. C., a distance of about 30 miles. Following this, wireless apparatus was placed on a ship, working with similar apparatus installed at Annapolis, the ship extending the range of transmission down Chesapeake Bay as practice improved. After this two ships had similar apparatus installed, each ship proceeding to sea for tests at varying distances and outside of any possible land interference. From this beginning experimentation may be said to have continued uninterruptedly. Every new installation is an experiment and suggestions of improvement are always looked for both in the regular working of stations and in especially devised trials.

But there are other besides Naval uses for wireless telegraphy. The Army saw possibilities in it both for service in the field and for peace purposes. The Light-House Board became interested; so, too, the Weather Bureau. There was seen, then, four Departments of the Government, the Army, the Navy, Agricultural and Commerce and Labor all taking up this new art, all experimenting with it and each applying it to its own service with a wasteful multiplication of effort and an inevitable overlapping of function. In recognition of this state of affairs, by order of President Roosevelt, representatives of the Departments concerned were convened in an inter-departmental Board to consider the whole subject. The recommendations of this Board have had the President's approval. One of these is that the Navy Department shall have control of all the coast-wise Government Wireless Telegraph Stations including the Island possessions and Canal Zone. Consequently upon this the Navy Department actively began the installation of Coast Stations, following a comprehensive scheme while at the same time installing wireless apparatus on most of the ships in commission and on all new ships of any considerble size. This scheme contemplates having all our coasts, Atlantic and Pacific, Island possessions and Canal Zone dotted with wireless stations, each in touch with its neighbors and all in communication with Washington. The enormous advantages of this scheme in time of threatened or actual state of war taken in conjunction with scouting ships equipped with wireless apparatus hovering off the coasts and forming chains of communication covering any stretch of the ocean, can readily be seen. This advantage was demonstrated by the events of the late war between Japan and Russia, but such demonstration was hardly necessary.

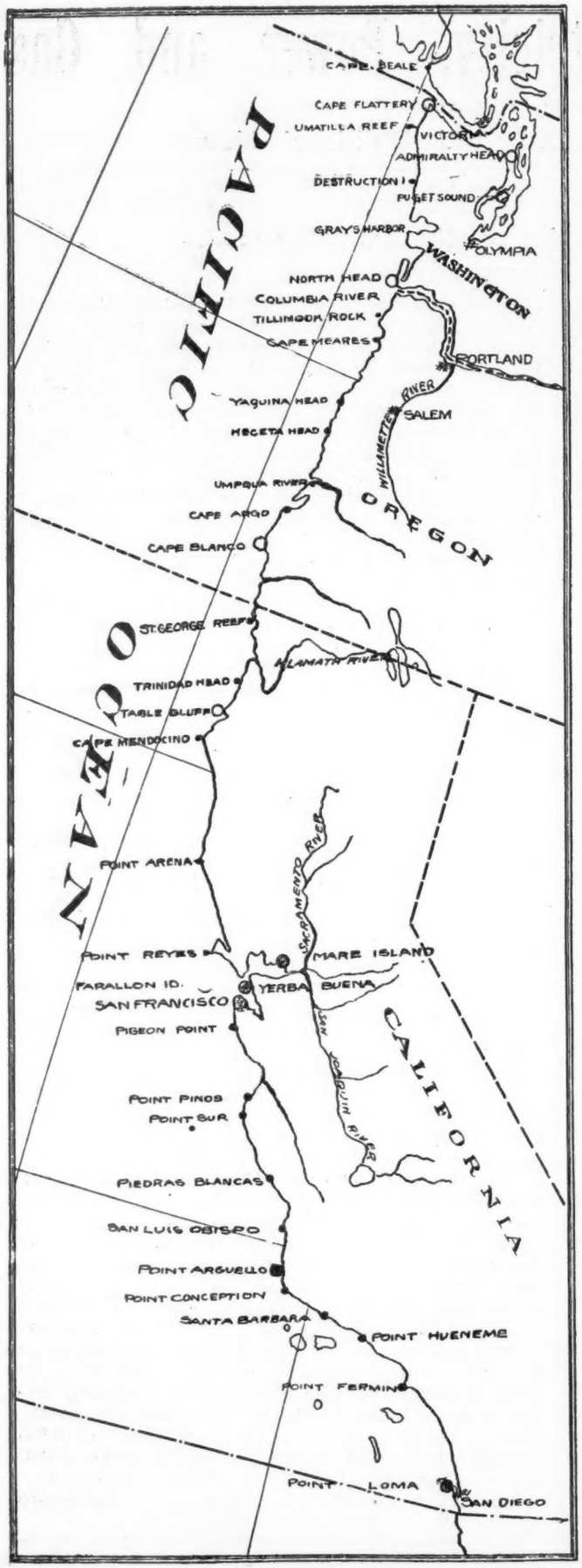
The Bureau of Equipment is the branch of the Navy Department to which the whole business of wireless telegraphy has been committed. At present fifty vessels-of-war are fitted with wireless telegraph apparatus. On the Atlantic Coast stretching from Maine to Galveston in the Gulf of Mexico and including stations at Culebra, San Juan, Porto Rico, Guantanamo on the South coast of Cuba, and Colon, there are 29 stations in operation and one at Galveston building. Three of these are on light-ships, namely, Nantucket South Shoal, Diamond Shoal off Cape Hateras, and Charleston Light Ship.

Attention was turned to the Pacific Coasts and the stations at Yerba Buena in the harbor of San Francisco and at the Navy Yard, Mare Island, were begun during 1903. There are now, in operation on the Coast six stations, with five others planned whose erection awaits only the funds necessary and most of which it is hoped will be open before the end of the calendar year. In addition, stations have been installed in Honolulu, at Guam and at Cavite in the Philippine Islands. Two other stations have been designed for the Philippines to enable the Admiral in command of the Philippine Squadron to keep in touch with his vessels operating among the islands.

The points selected for the Pacific Coast stations are at distances averaging less than 250 sea miles apart. This distance will place each station easily in touch with the stations on either side of it. From lack of funds to buy land the Navy Department has been restricted to points where the Government already owns land. These are usually Light-House reservations. But as Light-houses have been placed at practically all the salient points of the coast this restriction has not prevented the selection of equally separated points having over-water communication between them. The points selected are Pt. Loma near San Diego, Pt. Arguello, Mare Island, Yerba Buena, Farallones, Table Bluff (Humboldt), Cape Blanco, North Head (mouth of the Columbia river), Tatoosh Island, Cape Flattery, Admiralty Head or Point Wilson in Puget Sound and the Puget Sound Navy Yard.

A particular account of these stations in chronological order of building may be interesting.

Yerba Buena—This is on the island of Yerba Buena, San Francisco harbor, where is located the Naval Training



● Stations now working O Stations proposed

Distances—Point Loma to Point Arguello 234 miles, Point Arguello to Farallone Islands 251 miles, Farallone Islands to Table Bluff 216.99 miles, Table Bluff to Cape Blanco 150.37 miles, Cape Blanco to North Head 150 miles, North Head to Cape Flattery 241 miles, Farallone Islands to Mare Island 49 miles.

Station. This is a low powered station serving to connect the Training Station with Farrollones and the Mare Island Navy Yard. It has excellent telephonic and telegraphic communication with San Francisco and Bay Cities; consequently messages received from the Farallones having their origin there or received there for further transmission are readily handled.

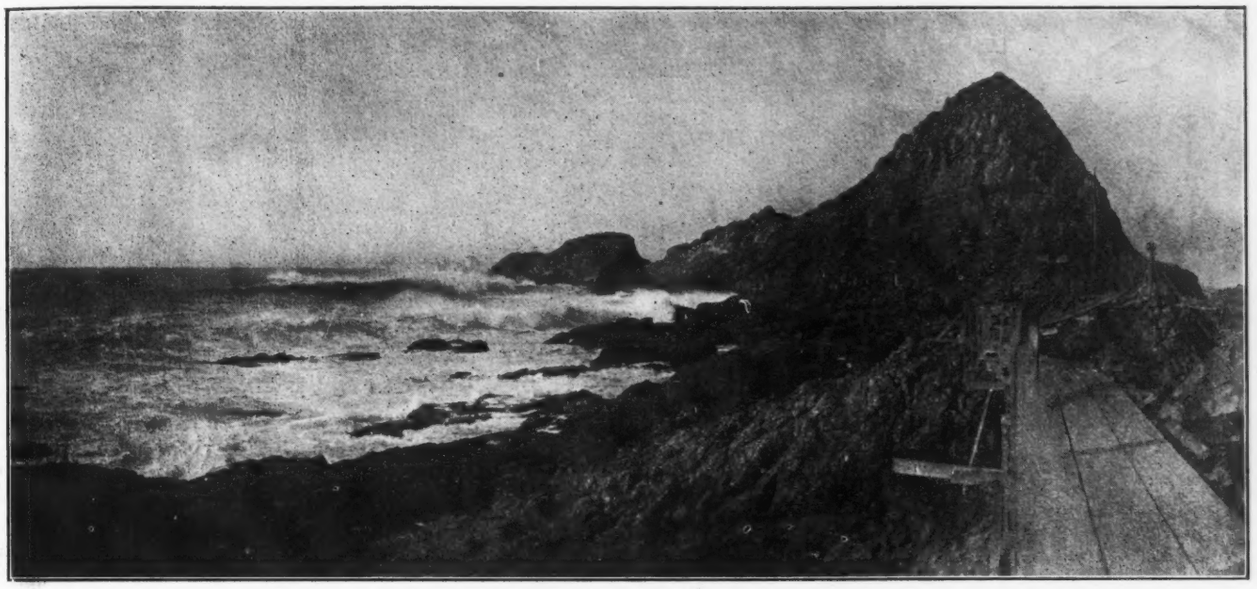
Mare Island Navy Yard—This station is now fitted with two masts and the very latest form of flat aerial stretched between them. It takes its power from the Navy Yard current, alternating, which is supplied by the Bay Counties Co. Mare Island may be considered a high powered station. A branch Naval Observatory is located on the Navy Yard from which noon time signals for the 120th meridian are sent out daily except Sundays, which set the time of the whole Pacific Coast. As instancing the desire of the Navy Department to make its wireless telegraph stations of as much value to the public as possible although the first object of these stations is the strategic control of the coast in wartime, the time signal service performed by the Navy at Washington and the Mare Island on land has been extended by means of the wireless to the sea as well. The noon time-signal is sent out daily from the Mare Island Wireless Station which will enable ships on the high sea to receive this signal and thereby check the errors of their chronometers. Other stations along the coast will be fitted to perform this same time service.

As originally installed Yerba Buena and Mare Island were low powered and inland stations. The next to be erected was to be a station for work seaward and naturally somewhere in the vicintiy of the Golden Gate. In looking for a site there was the restriction already alluded to, that it must be Government owned land. Otherwise Mt. Tamalpais would probably have been the chosen site. There were left to be considered Pt. Bonita and the Farrallones Islands, and the latter was decided upon. A glance at the views of the Island will show how little promise its topography gave for sufficient level ground on which to erect the mast and place the necessary buildings.

The only available level ground was under the peak, 343 feet high, on which the light-house tower stands. Before determining finally on this site, kite experiments were made, kites holding up the aerial and signals being sent to the battleship Ohio which steamed in a circle about the island. It was feared that the very close high land of the peak would obstruct the waves, but such did not prove to be the case. No trouble from this cause has yet been experienced. The erection of this station was attended with considerable difficulty, owing to bad weather and wretched landing facilities. In the first attempt to erect the sectional mast one of the section toppled over owing to the unaccountable parting of the guy steadying it. Cuts show the station, mast erected in process of erection, the fallen section of a mast and the character of the rock-bound shore line of the island

Chiefly for ease of handling in transportation the mast is in sections of 26 feet in length; seven such sections make the mast 182 feet high. A span runs from its top to near the base of the light-house tower where it is secured to the rock, being, of course, carefully insulated. From this span a fan-shaped group of wires form the aerial which leads into the operating room. Although thunder storms are rare on the Coast the light-tower has once, at least, been visited by lightning. The fear was expressed that securing this span so near the base of the tower was inviting other visits of lightning and it seemed at one time that opposition on this account would interfere with the erection of the station. Other counsel, however, prevailed, namely, that instead of increasing the danger from lightning the scheme proposed was furnishing additional protection. The station has been in operation since March, 1905, and thus far there has been nothing to confirm the fear.

The elevation of Mt. Tamalpais is in the line connecting Mare Island with the Farallones. The presence of this high land does not apparently affect communication between the two points. Farrallones is is now a 5 kilowatt station. When opportunity presents this power will be doubled and some modifications made in the aerial.



WEATHER BUREAU STATION, FARALLONES

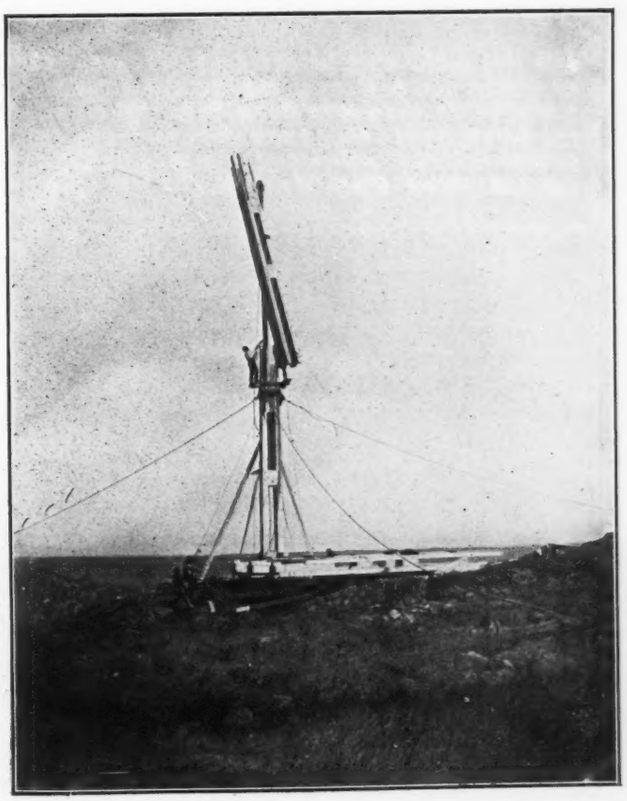
The station at Pt. Arguello was next installed on the light-house reservation at that point. This station has a single mast, and power of three kilowatts. No trouble exists in communicating night or day between Pt. Arguello and the Farallones, the line being all over water. As between Arguello and Mare Island some trouble has obstructed transmissions on bright, sunny days. Of course the effect of sun light comes in here, but part of the difficulty may lie in the fact that the line connecting Mare Island with Arguello crosses two ranges of mountains of considerable height.

The next station to be undertaken was that on Pt. Loma, near San Diego. This station successfully opened communication with Mare Island on May 11th last, which means, of course, easy touch with Pt. Arguello and the Farallones. The station is expected to maintain easy communication with Magdalena Bay 500 miles to the southward on the Lower California Coast. Magdalena Bay is the winter rendez-vous of the Pacific squadron for drills and target practice. It is a two masted station with a flat aerial, built on the ridge of Pt. Loma within the limits of San Diego Naval Coal Depot. The view from the station is a grand one, overlooking the city and harbor of San Diego, the mountains rising back of them and beautiful Coronado beach with a full sweep of the sea horizon from southeast to northwest.

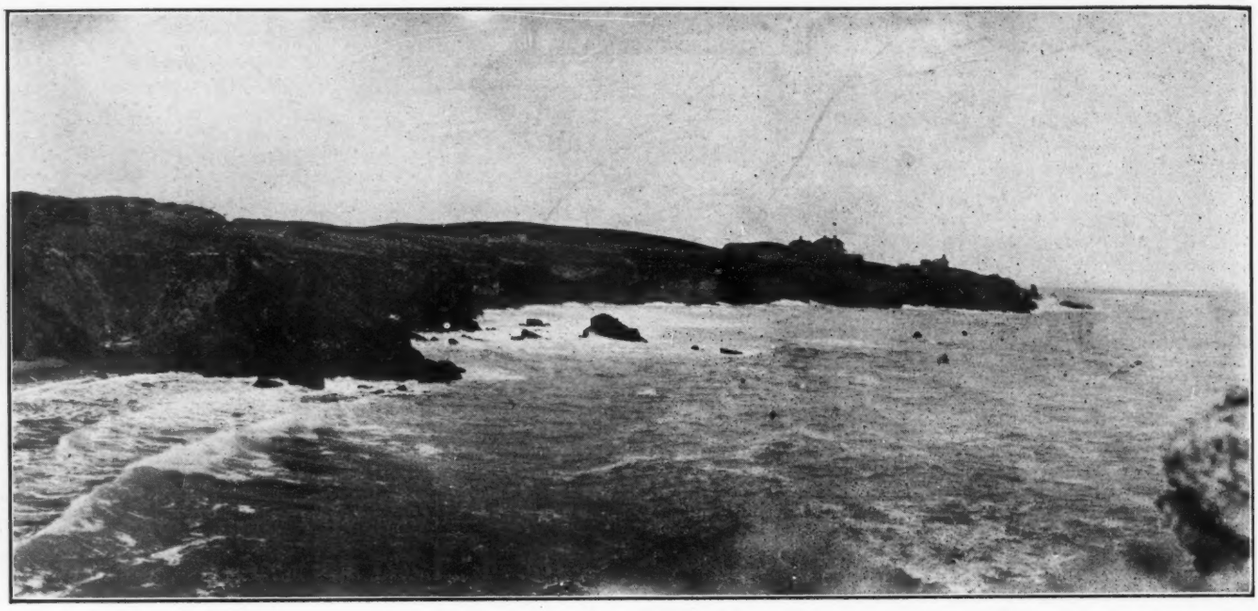
Proceeding north from the Golden Gate, the next station decided upon is at Table Bluff, near Eureka. Cape Mendocino was the point originally chosen for a site in this vicinity, subject to the condition that the station must be on Government land. A visit of inspection was made. No place in the world is believed to be so windy as Cape Mendocino, and the only land suitable for a wireless plant was found to be at an elevation of about 1000 feet exposed to the full force of the wind. Heavy gales from the southeast are frequent. The Light-keepers tell tales of being obliged to crawl the short distance from their dwelling to the light-house on hands and knees, fearful even then of being blown away. The Weather Bureau once had a station here and its records tell of frequent gales with the wind blowing over 100 miles an hour; often there were gales of 120 miles an hour and two instances found where the anemometer had registered 150 miles an hour and was then blown away while the faithful observer recorded that the wind blew still harder after this destruction of the wind gauge. Manifestly it would be impossible to maintain a station exposed to such violence, and Table Bluff, therefore, was selected as the next best site. It will be two masted.

Cape Blanco, on the Oregon Coast, is the next station to the northward and following that is North Head at the mouth of the Columbia river.

Next is Tatoosh Island, off Cape Flattery. This is to be a high powered station; it will probably be a duplication of the station at San Diego, and it is hoped it will be open for business within a few months. Interest in this station centers in the fact that Flattery is the turning point into the strait leading to Puget Sound, with the rugged coast of Vancouver Island beyond. It has been thought that had there been a wireless station on Tatoosh and had the Valencia, recently wrecked on the Vancouver shore, been



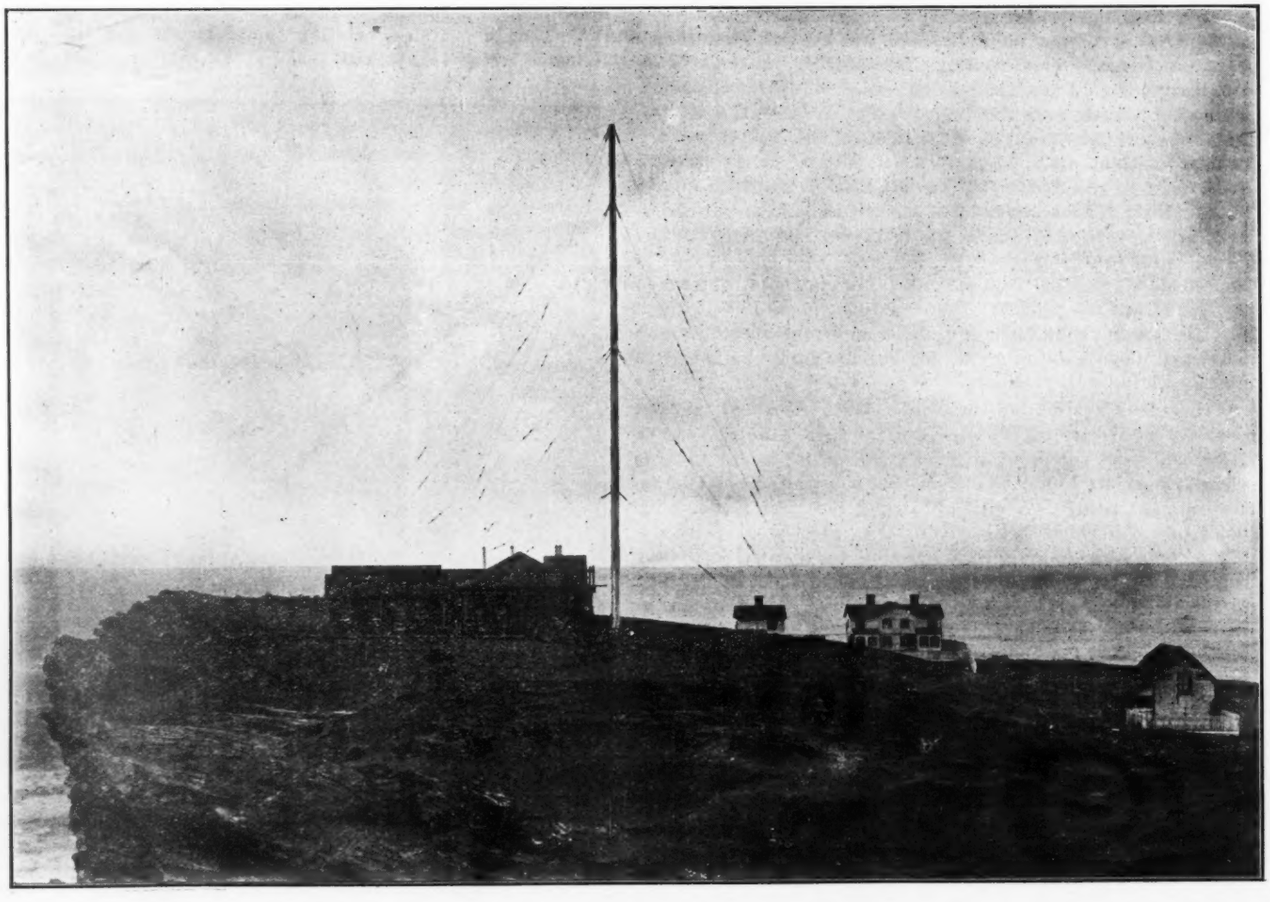
WIRELESS MAST IN PROCESS OF ERECTION, FARALLONES



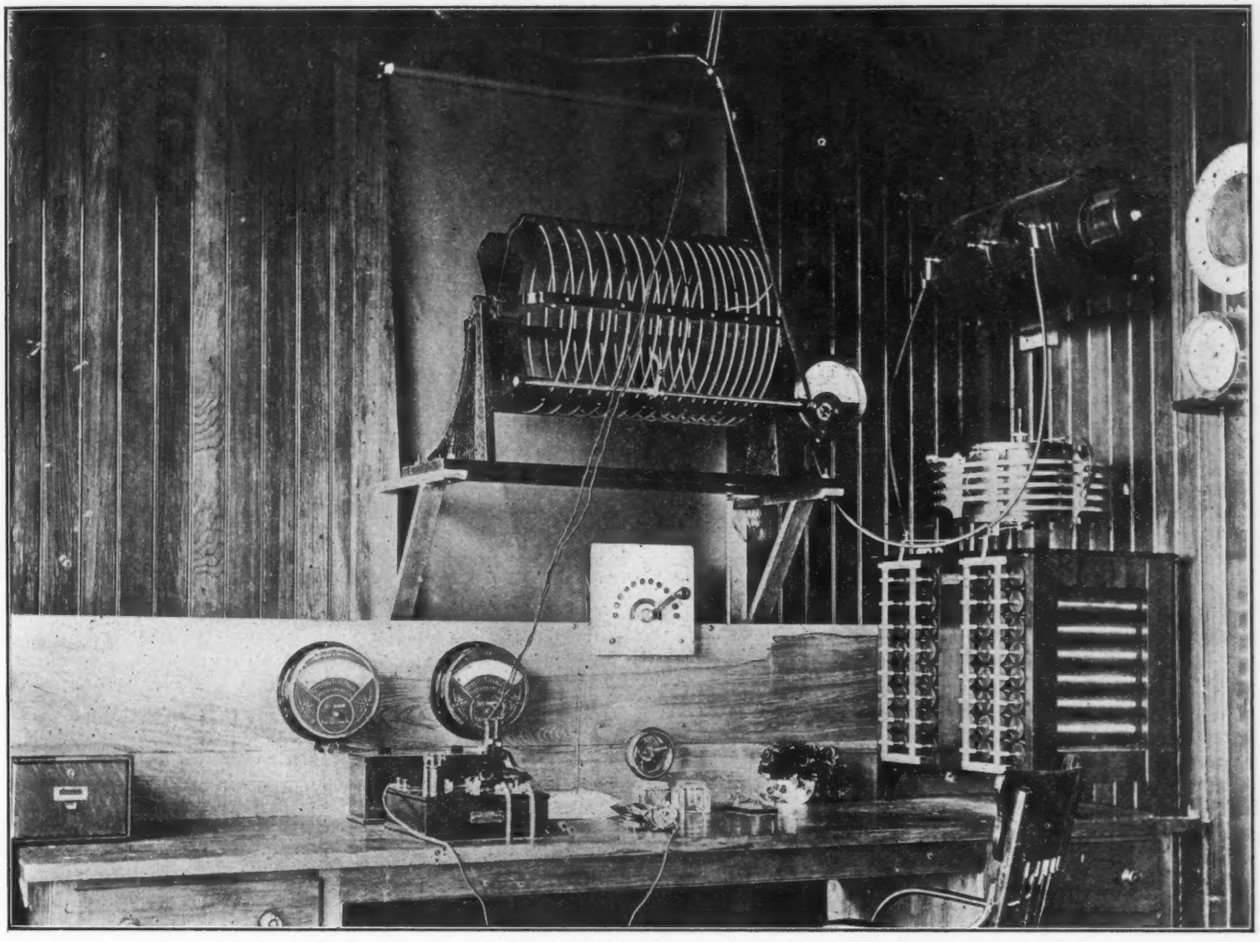
POINT ARGUELLO, FROM THE NORTH

equipped with wireless apparatus the disaster which came to that vessel would never have occurred. No matter how poorly founded such an impression may be it is tolerably certain that it will result in the early completion of this station and, possibly, in public opinions demanding that coast-wise passenger vessels be equipped with wireless telegraphy.

The question of the directivity of wireless messages has engaged the attention of inventors as well as the corallary to that, the determination of the direction of messages received at a station. Since this paper was begun have come reports of some recent experiments by Marconi in this connection. By grouping a number of horizontal receiving anteunae

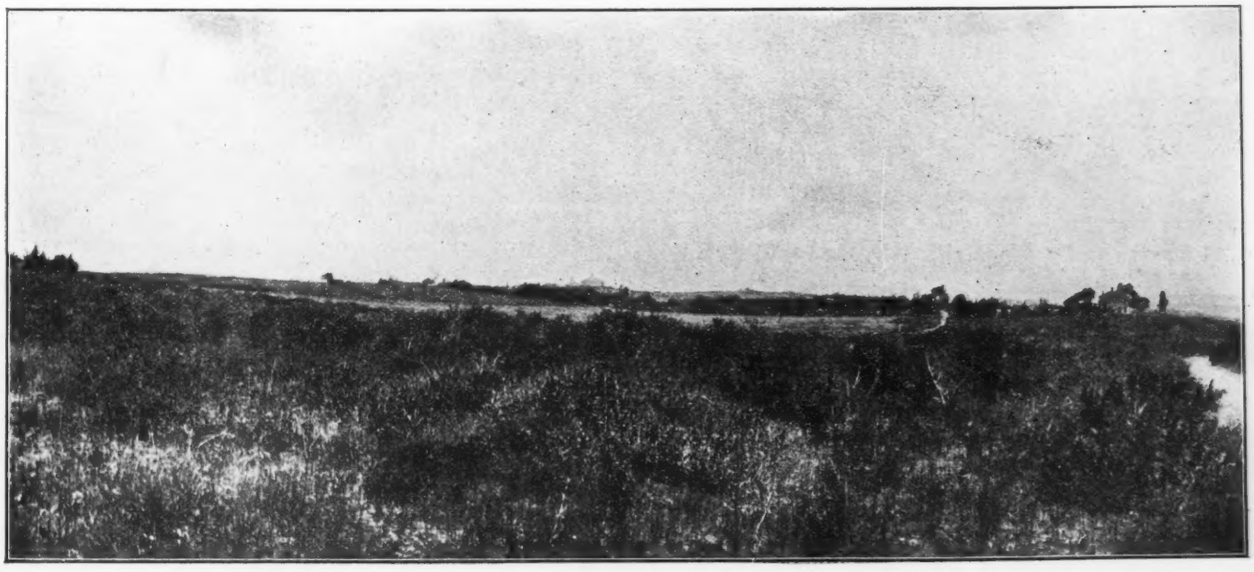


POINT ARGUELLO WIRELESS TELEGRAPH STATION NEARING COMPLETION

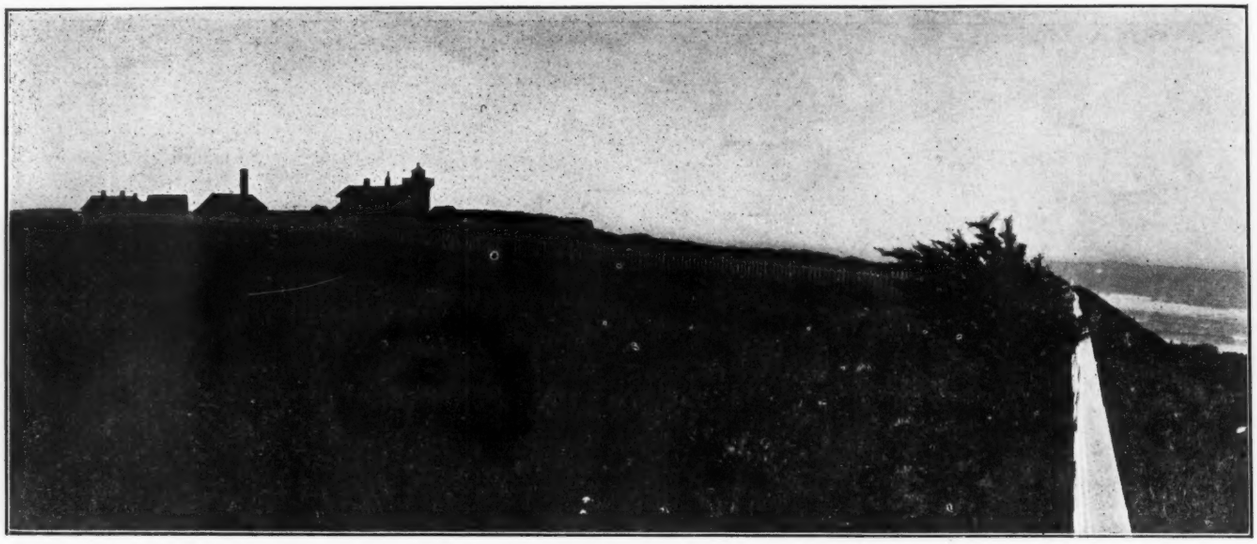


OPERATING ROOM AT POINT ARGUELLO

radiating from the receiver, each antennae having its independent switch to the receiver, it was found that by the variation of the intensity of the signals received on these variously pointed antennae the direction of the sending station could be determined within 36°. The sending station was a ship of war steaming about the receiving station. It is not improbable that further experiments along this line will bring better results: but even with the ability to determine the bearing of a ship passing near Cape Flattery in a fog within three points would make a repetition of the Valencia disaster wholly inexcusable, provided passing ships are equipped with wireless telegraph outfits and the



STATION AT POINT LOMA



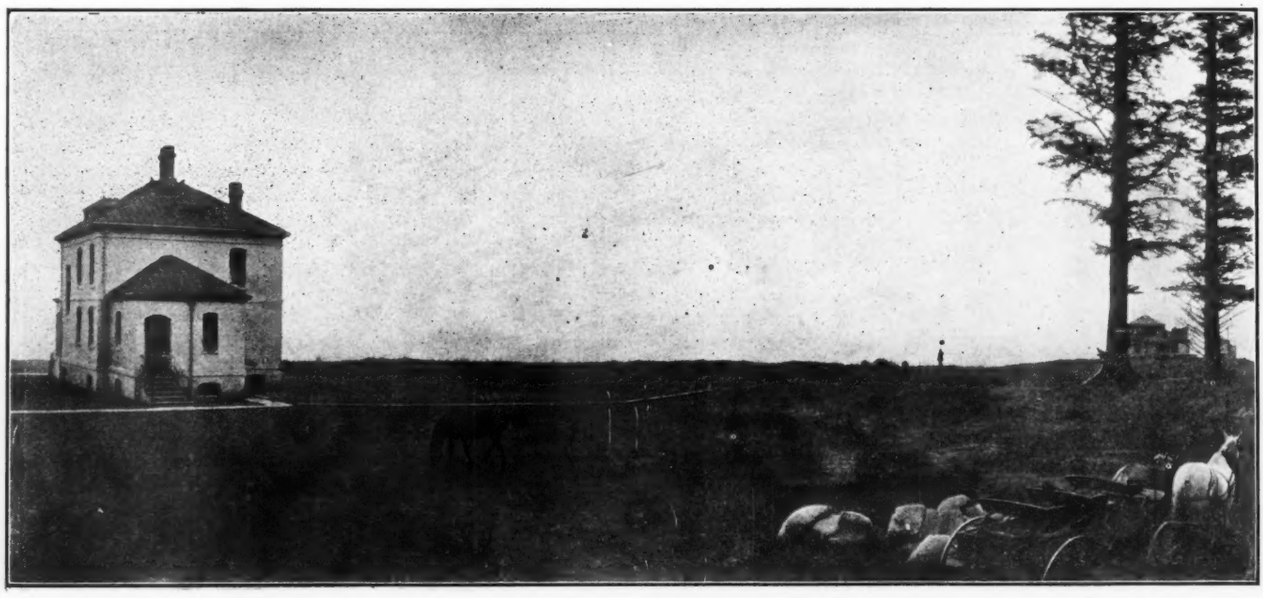
SITE OF WIRELESS STATION, TABLE BLUFF (HUMBOLDT)

Navy Department finds that the recent experiments of Marconi have really the value as reported.

At the end of the strait of Juan de Fuca, before turning into Puget Sound, is to be placed the next station, either at Pt. Wilson or at Admiralty Head. Then comes the remaining station , at the Puget Sound Navy Yard. This latter is in operation.

Alternating current is necessary to wireless telegraphy. For the more recent stations and those to be erected the power is derived from gas engines of Pacific Coast design and manufacture driving direct connected D. C. generators which charge storage batteries. From the latter the current is conveyed to motor-generators and thence to the induction coil. By use of storage batteries the engines need be run only when charging the batteries. With these batteries standing charged the station is ready at all times for business. But these gas engines work so promisingly, the time to start them from cold being so short, the scheme is being considered for application in the design of future stations especially those to be built in the Philippines, of using these gas engines to drive alternators, thus doing away with storage batteries and rotary transformers.

The Navy Department shows no partiality to any particular system of wireless telegraph apparatus. At the outset four foreign systems were experimented with and one was selected for the immediate equipment of ships and shore stations. As the art developed and American inventors came into the field the Department has treated the supply of wireless telegraph instruments practically as it would any other commercial article. It specifies a certain performance under specified conditions and awards have been made to the system best satisfying these conditions. As a result, with perhaps one exception, all the systems most generally known in this country are in use. On the Pacific coast there are four different systems employed in the various stations. Contrary to the claim once made by one of the companies earliest in the field that signals could not be exchanged between two different systems, no difficulty of this nature has ever been experienced. Nor could any such difficulty be expected; it is all matter of wave length of the transmitted energy and a receiver of any system adjusted to this length can take signals sent out by any other system. This leaves a free choice of systems for owners contemplating placing wireless apparatus on their vessels.



SITE FOR STATION, NORTH HEAD

Since the velocity of all etherial waves is the same as that of light the length of a wave varies inversely with the frequency. The frequency of the longest preceptible heat wave is 160 trillions; its length therefore is less than 0.002 of a millimeter. The shortest electric wave ever measured was about six millimeters, corresponding to a frequency of 50 billions. The length of a wave used in wireless telegraphy varies from 100 to 1000 meters. For work at short distances the shorter wave is used, while the longer waves are needed for great distances. When two stations are in tune, that is when the sending and receiving circuits have had the capacity and inductance of each of them adjusted to the same wave length, they are said to be "syntonized." It will then be that signals will be most clearly read and transmitted with less power. But this will not prevent the intrusion of other electric waves. This intrusion is "interference" and the interfering waves may be strong enough to destroy the signals which it is desired to receive. In spite of claims of inventors that they have overcome interference such does not seem likely to be the case. One system makes claims of a "selectivity" of 10 per cent. which means that waves whose length differs more than one-tenth of the wave length for which the station is tuned will be rejected. A high "selectivity" will reduce unintentional interference but cannot prevent intentional interference by the enemy in war or spiteful purpose of rival stations at any time.

Acoustics furnish analogies by which this may be understood. The ear receives sound waves somewhat as a receiver does the electric waves. One listnening to a speaker in a crowded room may yet distinguish the words of this speaker although there be a babel of voices. The "interference" of the babel may only inconvenience the listener, compelling a closer attention or the sounds may rise so high and be in such volume as to drown the speaker's words. And so in wireless telegraphy. It may be stated here that very often there is experienced an interference coming from stray electric waves in the atmosphere, referred to by operators as "static" or "atmospheric". The effect of "static" is often great enough to prevent communication and is always annoying. An extract from notes of recent experiments between Pt. Arguello and Mare Island will illustrate the above. "8:25 p m. Had operator at T. G. cut down current and spark; signals were very distinct and fairly loud on 15 amperes and one-half c. m. spark. S. D. (a commercial station at San Diego) was sending during the later test; could not tune them out or apparently weaken their signal; could hear T. G. over them and carried on conversation. Atmospheric signals were quite sharp but intermittent from 5:00 p. m."

In the practice of war games one fleet has kept plying its wireless appartus incessantly thereby blocking the signals of its opponents until it has passed clear. When the Russian ships steamed out through the difficult channel of Port Arthur for the fight of August 10, it is reported that the powerful station on shore began to grind out the Russian alphabet, thus paralyzing the weaker outfits of the Japanese pickets. Togo knew with exactitude the composition, course and disposition of the Russian fleet as it headed for Tsusima Strait as reported by wireless on his scouts which were not only in advance but in the rear of the Russian ships, and the Russians are sharply criticised for not keeping their wireless apparatus at work. This would surely have "interfered" especially as to messages sent through their fleet by Japanese scouts in their rear.

For the purpose of analogy the receiving device has been likened to the ear. Originlally the receiving signals were relayed from the coherer to a Morse recorder. But for long distance work the coherer is not sufficiently sensitive and the Morse recorder is too slow, 14 words, a minute. Consequenly electrolytic or magnetic forms of detectors or receivers, in conjunction with head telephones are now employed, a speed of 40 words a minute having been attained. This use of the telephone has made the aptitude and special skill of the operator a considerable factor in successful operation, particularly over long distances where the signals come in very faint. He is required to be capable of performing the general duties of an electrician on a man of war; he must be sufficiently expert in electrical matters to undersand the design, manipulation, construction and repair of the delicate telegraph apparatus; he must be skilled with the Morse key in transmitting and then, to achieve success, he must have an ear finely trained for the often feeble notes received by his telephone. The Navy trains its own operators. Its wireless system being for war purposes chiefly, these operators form part of the Naval force, wear its uniform and are subject to all its regulations while receiving all the benefits of regular service. They are subject to detail afloat or on shore, at home or among the Island possessions, as the exigencies of the service demand.

To meet the demands of the increasing number of wireless stations in the Pacific, in Honolulu, Guam and the Philippines and of the Pacific and Asiatic Squadrons, for wireless operators and general electricians a school was established at the Mare Island Navy Yard a little over a year ago on lines similar to one that has existed at the Navy Yard, New York for many years.

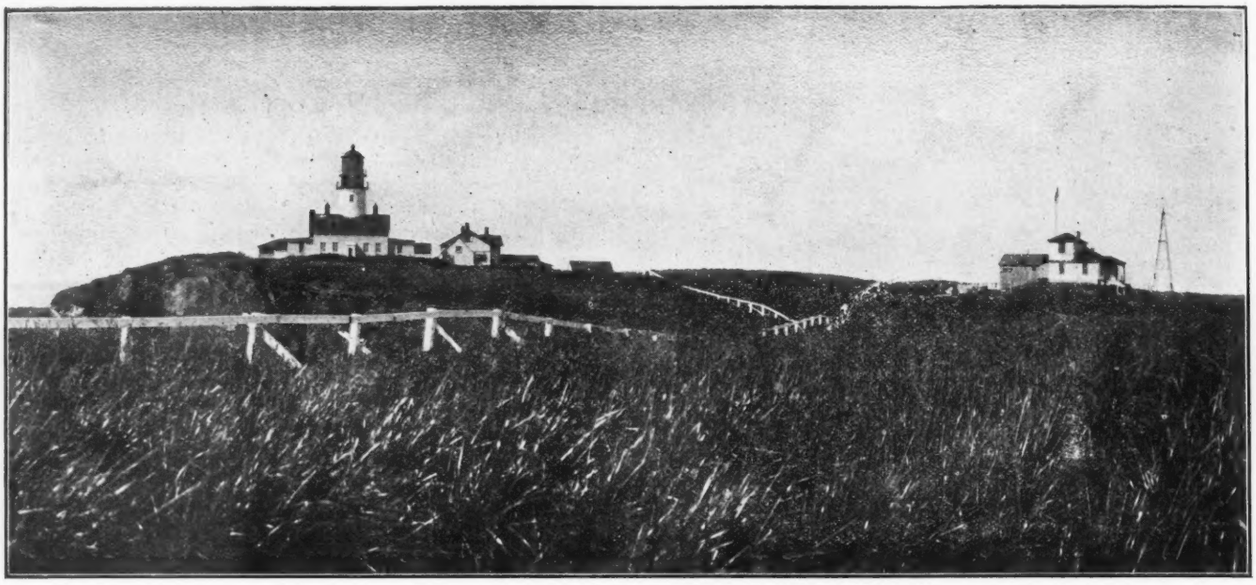
The course, lasting five months, is not an elementary one but partakes more of the nature of a post-graduate course. The young men taken into the class must be either electricians by trade or men who have had experience in handling dynamos and other electrical apparatus. Twenty is the average number of students now in attendance and those completing the course are able to meet the present requirements of the Navy in the Pacific.

The code at first officially employed was the "Navy Code," the same as the old Myer Army Signal Code. This was not satisfactory in speed. The operators were required, also, to possess the Continental Morse and the American Morse. Inasmuch as it is practically impossible for an operator to be equally skilled in three codes, the Continental Morse has become the official and regularly used code. Where operators come in touch with American land wires they must be familiar, of course, with the American Morse code. The school at Mare Island is equipped with mast and apparatus that permits practice with the station on the Island, with Yerba Buena and the Farollones.

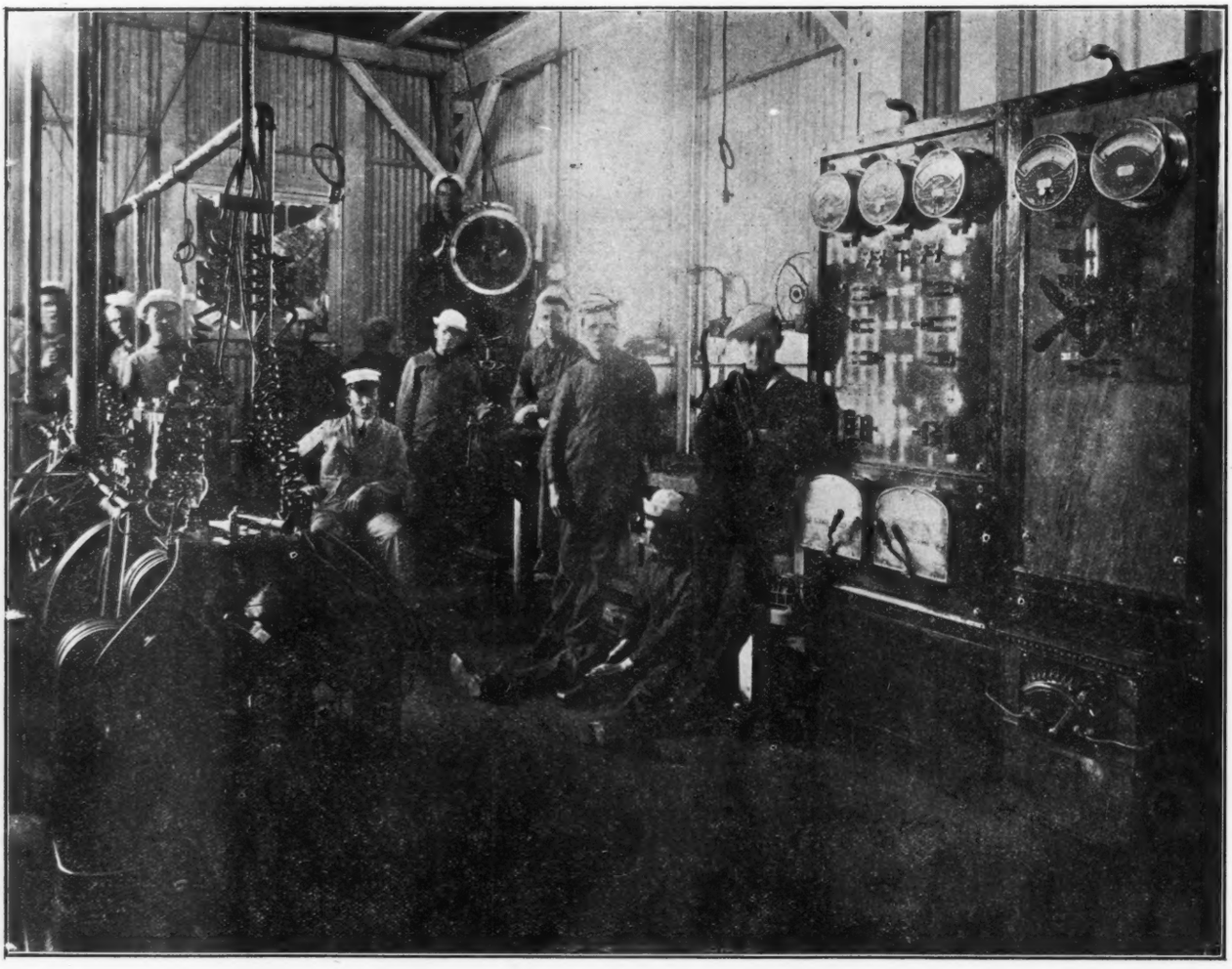
The code used is known to the world of course. Secrecy in war time is mandatory. This will be secured by use of special codes and enciphered messages. Special codes have been employed in the war games played by the Asiatic and Atlantic fleets, but as such codes will not be able to cover all possible contingencies cipher messages will undoubtedly be used as well.

As to the range of transmission now attained one reads much in the daily press. There is a difference between a distance surmounted under a favorable combination of circumstances and one over which regular communication may be relied upon. As between ships, or ship and shore station, 200 sea miles of reliable exchange is considered satisfactory. Shore stations have greater range than ships. It is a matter of record that Naval ships at sea have exchanged messages when 1700 miles apart. Between powerful shore stations still greater distances have been attained; at least two commerical companies have sent messages across the Atlantic This is a wonderful advance witbin a few years. It is recalled that in the experiments with foreign systems first attempted between Annapolis and Washington in 1902 at first none of these could bridge this distance, which is only 30 miles.

Some of the seeming idiosyncrasies of wireless telegraphy might be mentioned. One of these first noted by Marconi, is the effect sunlight has upon the electric waves and one which Naval experience has confirmed: Sunlight reduces the range of transmission. By night the range is from



LIGHTHOUSE AND WEATHER BUREAU STATION, TATOOSH ISLAND, CAPE FLATTERY. SITE FOR WIRELESS STATION IN FOREGROUND



THE ELECTRICAL SCHOOLS, NAVY YARD, MARE ISLAND

two to three times that by sunlight. Cloudy skies if extending over the whole range, have the effect in a lessened degree of the night's darkness. According to the most recent theory, having in view the relationship between electrical and optical phenomena, it is thought that under the action of the ultra-violet radiations from the sun detached electrons are found disseminated in the atmosphere whose presence makes the air a feeble conductor. The electric waves which in a perfectly insulated medium would follow the surface of the earth when they meet even a slight conductivity are rapidly dissipated. Whatever the theory the fact remains, and signals impossible of transmission by day between two stations are easily exchanged at night.

The pest of "static" or "atmospheric" interference has been noticed. It has been thought to connect the exhibition of this disturbance with the barometric tides.

One great and happy peculiarity of the electric waves of wireless telegraphy is the fact that they do not travel in a straight line, but instead slide upon the earth's surface, not only following the curvature of the earth but riding up slopes of high land and sinking into valleys. Were it otherwise the waves would go off into space and such feats as sending messages 2000 and even 3000 miles over the Atlantic Ocean, as have been accomplished, would be impossible. This sliding motion, too, whereby the waves glide over instead of passing through high mountain ranges permits the attainment of distances overland As a rule, however, over-water transmission is better than that over-land.

One peculiarity has been noticed in the East, the difficulty of communication between the Highlands of Navesink and Cape Henlopen, and between the former and Montauk Point at the end of Long Island. It is theorized that the sand of the New Jersey and Long Island beaches causes the trouble. Montauk Point and the Navesink stations will be abandoned and a substitute built at Fire Island. The above is explained by what is called the "mirror effect" wherein it is imagined that the waves, closed lines of force, are half above the earth's surface as on a mirror the other half being below like a reflected image.

Naval wireless telegraphy is part of the Nation's equipment for war. This does not forbid making the stations of a great public utility as possibly where the interests of commercial wireless companies are not interfered with. Consequently daily time signals are sent seaward from them. Messages received from ships at sea by wireless, by the International flag signal code or any other recognized form of signalling at sea, are forwarded and similar messages delivered to ships. The stations work harmoniously with the Weather Bureau in the latter's performance of marine reporting as required by statute, receive and display the Weather Bureau storm signals and from May 1, 1906, began the reception and transmission to the Weather Bureau in Washington, D. C., of daily meteorological observations taken by ships at sea. When all the stations on the Pacific Coast shall be in operation there will be given a boon to those who sail upon its often troubled waters, for it is believed that coasting ships will equip themselves with wireless apparatus and thereby will be able always to keep in touch with the mainland.

STREET RAILWAY CONVENTION.

The program for the convention of the American Street and Interurban Railway Association is ready and a list of papers has practically been decided upon.

The first session is to be held on the morning of Wednesday, October 17. After the roll call and address of welcome, the president will deliver his annual address, which will be followed by the reports of the Executive Committee and secretary and treasurer. Accounts of the work done during the past year by, and the future plans of the affiliated and allied associations will then be presented by the presidents of the four associations. It is thought that this will occupy the time from 10 a. m. to 1 p. m.

The afternoon of Wednesday, October 17, will be devoted to the reports of the following committees: Membership; Compensation for Carrying Mail; Subjects; Car Wiring; Standardization of Equipment; Insurance, and Promotion of Traffic. Discussion on these reports will follow.

The next morning will be "interurban" meeting, and the following papers and reports of standing committees have provisionally been decided upon: Report of Committee on Heavy Electric Railroads; paper on "Electric Railways in Sparsely Settled Communites;" paper on "Interurban Limited Trains;" paper on "Interurban Freight and Express;" paper on "Tickets and Rates;" paper or discusison on "City, Suburban, Interurban and Railroad Traffic."

On Thursday afternoon, October 18, the session will be devoted to the subject of employees, with the following reports and papers: Report of Committee on Welfare Work; report of Commiteee on Rules; paper on "Y. M. C. A. Branches;" paper on "Instruction of Train Men;" paper on "Discipline of Train Men;" paper on "Uniforms and Badges;"

The session Friday morning, October 19, will be an executive session, and Friday afternoon will be devoted to a report of the Nominating Committee, election of officers and unfinished business. The banquet will be held Thursday evening, October 18, at the Southern Hotel. It has been decided to print in advance of the meeting all of the papers and reports of committees.

A "CHIMNEY FLUE SKYSCRAPER"

New York, that modern great municipal canyon of towering skyscrapers, is about to have a new one erected on Wall street on what is said to be the most valuable piece of property in the world. This is on the southeast corner of Broadway and Wall Street, opposite Trinity Church. The piece of ground is only 30x39 feet, but a building is to rise on that narrow foundation to a height of 220 feet. The cost of this structure will be about $300,000. The work is about to begin, but it will not be finished until January 1, 1907. This will be the tallest building ever erected on so narrow a base and the architects have been giving very careful attention to the structure in order to brace it against all possible contingencies. The interior will be of steel and bronze finished with no attempt at ornamentation. It is to be rendered absolutely fire-proof, rather than attractive to the eye. It is really no more than a huge flue. There are probably chimneys on factories in America with as broad a base as this building is to have. To render it entirely fire-proof the steel frame is to be protected by hollow tile. Every beam, girder and column is to be encased in this material estimated to be unburnable. The floor and partitions will be of hollow tile.

Book Review.

Brown's Directory of American Gas Companies; 1906 edition; octavo, cloth. Price, $5.00. Progressive Age Publishing Company, publishers, 280 Broadway, New York.

This valuable annual gives statistics of gas companies and gas associations throughout the United States, Canada and South America. The officers of each company, amount of capital stock and bonds, method of manufacture, prices of material, number of meters, approximate miles of mains, annual output, population of district and proportions sold for illumination and for fuel are given for each company. All manufacturers and engineers who have dealings with gas interests will certainly require this book for reference, and it should prove a valuable list for all dealers in electrical and gas supplies.

The JOURNAL OF ELECTRICITY
POWER AND GAS
WITH WHICH IS INCORPORATED
The Engineers' Architects' and Builders' News

Published Weekly by
The Journal of Electricity Publishing Company

Yearly subscription, $4.00. Single copies, 10 cts. Foreign subscription, $5.00
Subscriptions cannot be begun with back numbers
Manuscripts submitted must be accompanied by postage to insure return

Address all communications and make all remittances payable to the Journal of Electricity Publishing Company

Entry changed May 1, 1906, to "The Journal of Electricity, Power and Gas," with which is incorporated "The Engineers' Architects' and Builders' News."
Entered as second-class matter at the San Francisco Post Office, August 15, 1899.
Entered as "The Electrical Journal," July, 1895.
Entry changed to "The Journal of Electricity," September, 1895.

VOL. XVI JUNE 9, 1906 No. 10

EDITORIAL

The New Epoch.

The pinacles which mark the outlines of history, introducing new eras of events, are interesting subjects for consideration. When, however, one of these great epochs occurs in our own lives, its lessons then become matters of vital importance.

The fire marked an epoch in the history of California. A new era has begun. The former things have passed away. Money, houses and goods may have disappeared, but a capital remains greater than them all. This capital consists of the marvelous courage and the indomitable energy of our people.

Enmities, bitterness and greed have disappeared, and in their stead business intercourse is characterized by unassuming manners, brotherly consideration and generous rivalry. We do not mean by this that the Millenium has arrived, but, rather, that the business world has righted itself. "One touch of human sorrow makes the whole world akin."

When all stood on the same level, the shallowness of human pretension was revealed. Then, it became a test of character more than one of position or money. The characters and reputations built on the sand were shaken down, while the reliable attributes, the essential characteristics of the real man, were more firmly established and stood like steel columns amidst the surrounding wreckage.

More important than the question of insurance premiums and building laws, is that of establishing permanently this Brotherhood or Comradeship in our business world on the Coast. Let us have competition and lots of it; but let it be fair and without bitterness. Avoid "knocking." Stand together, back to back, in the upbuilding of our city.

Let us take up the cudgels for rather than against our neighbor. Love of our city and loyalty to each other will contribute to our great and permanent prosperity and cause San Francisco to become "a city set upon a hill which cannot be hid."

Elevator Trust Enjoined.

The Otis Elevator Company and the fifteen or twenty other defendants in the suit entitled "The United States against the Otis Elevator Company et al.," consented to the issuance of an injunction restraining them from entering into unlawful combinations with each other.

Among the things forbidden the elevator companies are the following:

Combining in restraint of trade.

Contracting together, expressly or impliedly, as to the trade or commerce in elevators or elevator machinery between California and other parts of the Union.

Entering into any agreement to deprive the people of San Francisco or of California, or of any other State, of such facilities, rates and prices as would be afforded by free and unmolested competition.

From monopolizing the trade or conspiring to hinder importation, delivery, production, manufacturing or selling.

Agreeing as to prices or division of territory.

The officers or agents of one company are forbidden to act as agents or managers for any other companies.

Notice to Subscribers.

We request each of our subscribers to send us his name and address and date of last payment; also copy of receipt therefor, in order that we may compare same with such of our records as were saved from the fire and avoid any possible errors or omissions. Also, all San Francisco subscribers should send us their new addresses in order to facilitate prompt delivery through the post-office.

Back Numbers of "The Journal."

If you have any and can spare same we would request that you forward them to our office, Atlas Building, 606 Mission Street, San Francisco. We have constant need of back issues of THE JOURNAL, and as our reserve copies (including our bound volumes) were entirely destroyed by the fire, we must depend upon the kindness of our friends in replacing same.

PERSONAL.

Mr. Harry H. Hornsby, manager of conduit sales for the Sprague Electric Company, is now in this city and is co-operating with his Pacific Coast representative, Mr. Parker, in extending the sales of the Greenfield flexible conduit and flexible steel armored conductors. Mr. Hornsby will remain in the city for about two weeks.

Mr. W. B. Scott, the Los Angeles representative of the Electric Appliance Company, has been in San Francisco during the past week, making his headquarters at their San Francisco office, 111-121 Townsend Street.

Mr. L. M. Clark, representing the Rail Joint Company of New York, says the "Pacific Building and Engineering Record," has opened up offices in the Marquam Building, Portland, making his residence at the Hotel Portland. He formerly made his headquarters at San Francisco, but the fire forced him to go to Portland, where, it is said, he may remain permanently.

Industrial.

PHOENIX TOOL & VALVE COMPANY.

W. D. Caldwell, late of Baker & Hamilton's sales department, announces his association with C. F. Mitchell, and under the above title will succeed to the business of Charles Fred Mitchell & Co., Pacific Coast representatives, of 6 Mission Street, San Francisco. They will make a specialty of high grade engineers' and machinists' supplies. Their line includes Jenkins globe valves, of which they have a large stock on hand; Ashton steam gages and pop valves (complete line in stock, any size, any pressure); Mason's regulators; American injectors and a complete line of steam and brass goods. They also carry a full line of miscellaneous hardware for the shop, including drills, taps, hack-saws, files and handles. The quality of goods they handle and the efficiency of service rendered will, we know, secure for them a large patronage. They succeed a business already established, and Mr. Caldwell's own personal popularity will tend largely to increase same.

MACHINE TOOLS

Incident to getting out contracts, the local manufacturing concerns found the large stock of machine tools and general machinery carried by the Hallidie Machinery Company, of Seattle, of considerable assistance. This northwestern house is the largest of its kind north of this city. The Hillidie people represent most of the companies in the north which the large supply houses in this city handle in the California territory. They carry a very complete stock of machine tools, making that feature of their business a specialty and have furnished the shop equipment for practically all the users of such apparatus in the northwest. They also enjoy the unique reputation of being the only Western concern who ever succeeded in getting a share of the Isthmian Canal commission business. This they did to the extent of furnishing about $75,000 worth of machine tools, which were shipped direct from the factories to New York and thence to Colon by Government steamer. By confining their efforts to complete power plant work in the steam, hydraulic and electric lines, and to strictly high grade machinery for iron and wood working purposes, the Hallidie Machinery Company are in a posiiton to specialize in each department with consequently high efficiency for both themselves and their customers.

HUNT "INDUSTRIAL" RAILWAY

W. D. Stivers, chief executive engineer of the C. W. Hunt Company, with offices at 45 Broadway, New York, is now in this city arranging for the introduction of their specialties with the manufacturers on the Pacific Coast. He will make his headquarters at the Occidental Machinery and Engineering Company, 609 Harrison street, corner Second, San Francisco, who will act as his Pacific Coast agents.

The C. W. Hunt Company manufacture a special railway 21½ inches gauge used in manufacturing establishments. They furnish every part for the installation of a railway, including rails, steel crossties, switches, curves, crossings, turntables and other parts of the running gear; also cars suited for every variety of service and especially designed electric locomotives. This company also manufacture coal handling machinery from the simple mast and gaff hoisting for canal boats to the most elaborate plant that will unload the largest vessel in one day. They also make the Hunt noiseless gravity conveyor, steam hoisting engines, electric hoisting engines and the "Stevedore" Manilla Rope. They have over thirty-three years experience in this work with large shops located at West New Brighton, Staten Island, New York.

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Brief Interviews With Leading Manufacturers and Dealers on the Present Situation and Prospects.

General Electric Company—Mr. Barber said: "The amount of business transacted by the Pacific Coast office at the present time is exceedingly gratifying. Our stock is arriving promptly and in splendid shape. Our Eastern office is giving special study to the San Francisco needs and manifesting a liberal policy towards the Pacific Coast. We have recently sold the United Railroads equipment for 100 cars for their city service; also motor equipment for twenty cars to the Oakland Traction Company."

Westinghouse Electric and Manufacturing Company—Mr. Briggs said: "We have recently sold the Northern Electric Company, who own the line running from Chico to Oroville, which is to be extended to Sacramento, fifteen motor generator sets of 500 kilowatts each and twenty motor equipments with multiple unit control. The motors for these sets are a very large size, being 100 horsepower each."

Benecia Iron Works—Mr, Bank said: "Our shops at Benecia were but slightly damaged and it took only a few days for us to make repairs and have our work going on as usual. We are very busy and our goods are taken up as fast as we can turn them out. We are now filling large orders for the California Gas and Electric Corporation, California Electrical Works, The Schofield Construction Company and others.

Charles C. Moore & Co., Engineers—"We are extremely busy in all of our departments and certainly feel satisfied with the business prospects. One of the large contracts which we have recently secured is that of a complete sixty stamp mill, cyanide and crushing plant to be erected at Millers, Tonopah, Nevada. This order will amount to fully $325,000, and is to be completed within six months. The 100 stamp mill at Millers is now nearly completed, so that this will be practically an extension of their present facilities. The mill will be driven by motors, power being taken from the electric plant which we installed. We are also now installing an additional 300-kilowatt unit in the steam plant owned by this company. The equipment consists of a McIntosh & Seymour engine and Westinghouse generator."

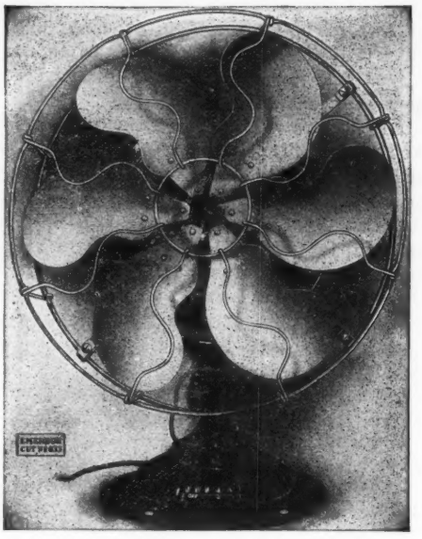
Allis-Chalmers Company—Mr. Scribner said: "Enquiries are increasing every day. Several large negotiations are held up pending insurance adjustment. All of our salesmen report that their customers are extremely busy. With the building now going on there should be no idle men in San Francisco. We are at present able to take care of all our inquiries, and with our added facilities in the San Francisco and Oakland offices we feel that we will exceed this summer the business of the corresponding season a year ago. We venture to predict a big boom for California in general and San Francisco in particular. There is a most active demand for rock crushing plants, cement machinery, sawmill apparatus and flour mill equipment. Enterprises projected before April 18th are now going ahead. Business men have the situation sized up, know now where they stand, and are tackling the new conditions to be met with vigor and courage. On July 1st our main office will be in the Atlas Building, San Francisco, where we will have our full corps of salesmen and office force and an entirely new office equipment."

Electric, Railway and Manufacturers' Supply Company—Mr. Samuel H. Taylor said: "We are now in our new building, which is conveniently located directly at the center of electrical interests, just around the corner from Westinghouse. Our floor space is equal to that of any electrical firm in the city. We have a large stock of electrical goods on our shelves and lots more on the way. We would like to see all of our old friends and customers, and take this opportunity of inviting them all to call."

Falls City, Or.—City Council has granted the Luckinamute Valley Water Power and Electric Manufacturing Company a franchise to operate an electric light, power and manufacturing company.

Immediate Deliveries from Stock

EMERSON FAN MOTORS



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News Notes.

San Francisco, Cal.—The San Francisco Gas and Electric Company have ordered of the General Electric Company 600 arc light equipments for street lighting, comprising latest type arc lights, with constant current and switchboard controlling apparatus.

San Francisco, Cal.—The Southern Pacific has leased nine floors of the James Flood building, at Market and Powell streets, and will move all its office force there as soon as it is ready for occupancy.

Independence, Or.—The Willamette Valley Light and Power Company has purchased the Independence and Monmouth Water and Electric Light plant. E. W. Hall, representing the new company, has been here making preliminary arrangements for the transfer.

Los Angeles, Cal.—The Los Angeles Railway Company has ordered from the Westinghouse Electric and Manufacturing Company 200 forty horsepower electric motors which will be used in the equipment of fifty new cars which the company is adding to its rolling stock

Portland, Or.—With a view of perfecting plans for the future management of the properties included in the recent merger formed by the Clark and Seligman interests, Henry W. Goode, president of the Portland General Electric Company, has left for the East. F. I. Fuller, president and general manager of the Portland Railway Company, departed previously over the Northern Pacific on the same mission. The two officers will meet with representatives of the houses owning the plants at Philadelphia and New York, when details will be arranged. Many improvements are under way on the two systems, and more have been outlined, and it is thought that after the Conference announcement will be made of additional betterments. The new owners propose to bring the standard of the road to the highest point and will spend large sums on improvements.

Salt Lake City Utah—The principal holdings of the Mormon Church in the Utah Light and Railway Company are to be taken over by a $25,000,000 corporation composed of English and American capitalists. The new company ,it is said, will also acquire the Ogden Street Railway. It will be known as the Inter-Mountain Consolidated Railroad Company and the board of directors will include H. H. Vreeland of New York City. Simultaneously the announcement was made that the Salt Lake and Los Angeles Railroad, another Church property, has been sold to a local syndicate for $500,000.

Echo, Or.—The Butter Creek Telephone Company will extend its line from Echo to the government reservoir site at Hermiston, eight miles from this place, and also to the different government engineers' camps along the proposed canal line. A large force of men is employed in this work. This extension will be over thirty miles in length, and will be supplied with six wires. It is intended to connect all the districts under the government irrigation system with the central office.

Portland, Or.—The Northwestern Tile and Brick Company, just incorporated, proposes to make pressed brick on land owned by Mrs. A. L. Morris, in Clackamas County, nine miles from Portland. The incorporators are A. L. Morris, president; E. W. Holcomb, vice-president and treasurer; C. M. Morris, secretary, and R. C. Kinney, assistant secretary. The headquarters will be at Sunnyside and they propose to furnish pressed brick equal to the Newberg article, and tiling as good as can be made any where. Mr. Holcomb is an expert brick and tilemaker from Ohio, and says the clay is equal to any in the world for the manufacture of pressed brick.

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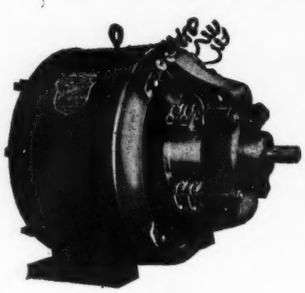
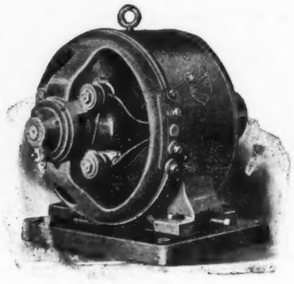
Milwaukee, Wis., U. S. A.

ALLIS-CHALMERS MOTORS



Type "N" Motor.



Type "B" Motor.

All Types
All Sizes For Every Service

ALLIS-CHALMERS MOTORS embody the result of fifteen years' experience by the best engineering talent in building small motors. Their compact design, rigid construction, easy running and superior workmanship has made them the peers of any of their class. They are made either open or enclosed, and for operation on the floor, ceiling or side wall, and can be arranged for direct connection, belting or gearing as required.

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Near Second

SAN FRANCISCO

Washington, D. C.—The conference report on the military appropriation bill has been agreed to and the bill now goes to the President. This bill contains a provision authorizing the expenditure of $1,500,000 at Fort Mason for army supply depots and transport docks, and makes $750,000 immediately available to begin the work of construction. Immediately upon the approval of the bill by the President plans will be made to erect warehouses, stores, sheds, stables, lighting and power plant, wharves, etc., at Fort Mason, as well as office headquarters. Detailed plans were made some months ago and estimates of the cost compiled. With slight modifications these plans may now be executed.

Tocoma, Wash.—The Pierce county commissioners granted the application of the Tacoma Railway & Power Co. for a franchise for the American Lake line from South Tacoma. This line is to be extended to Olympia.

Tocoma, Wash—Two electric railway lines, one running to Steilacoom and the second touching Lake Steilacoom. Gravelly Lake and American Lake, are to be built this year by the Pacific Traction Co.

Seattle, Wash.—Everett interurban cars will be brought through Ballard into Seattle over the shore line of the Seattle Electric Company as soon as Fred E. Sanders completes his new electric road.

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In Spite of the Fire and the "Eleva'o:" Trust

STYLES	NOW RUNNING
FULL AUTOMATIC ELECTRIC HYDRAULIC BELT AUTOMOBILE BUILDERS' HOISTS	Atlas Building (10 stories) Mission St., nr. Second Western Addition, Masonic Hall, Fillmore St. Regillus Apartments, Pacific Avenue, nr Van Ness Merchants' Ice and C. S. Co., Sansome, nr Lombard Volkman Building, Jackson St., near Sansome (One Hundred of our Elevators Burned)

The *Van Emon Elevator* in the *Atlas Bldg.* (10 stories), Mission St., near Second, was the first electric elevator to run since the fire.

Van Emon Elevator Co.

46-54 Natoma St. San Francisco

Our eight elevators in Mr. H. E. Huntington's "Pacific Electric (Railway) Bldg." Los Angeles, Cal., we refer to as a Model Elevator Installation.

The PARKER

Water Tube Boiler

Secures Greater Absorption of Heat and Consequent Economy

NO *WET STEAM BURNT TUBES LEAKING*

A NEW SYSTEM OF STEAM MAKING. Practically a Non-scaling Boiler. — While the scale forms it cracks off and is found in the scale pocket at the front ends of the drums, whence it is easily removed through the manhole when the boiler is down for inspection.

The Philadelphia Rapid Transit Company are building one of the largest and best equipped power stations in the world. It is to contain sixty-four Parker Double Ended Superheater Boilers over automatic stokers. Each boiler will develop 1000 boiler horsepower without being forced, making over 100,000 engine horsepower for the station. This is the fifth order from this company, which already had over 10,000 horsepower of these boilers in use.

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Keystone Boiler Works

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Westinghouse Electric and Mfg. Co.

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DENVER, 512 McPhee Building
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Office and Works, Blanding Ave., near Park St., ALAMEDA, CAL. *Phone 91*

Boise, Idaho—W. A. Coughanour is vice president and F. A. Snyder president of a company composed of Oregon men, who have organized the Idaho Electric Light and Power Company, for the purpose of building a dam and installing 1,200 horsepower north of Sand Hollow, on Payette River.

Seattle, Wash.—At the Heffernen Engine Works on Railroad avenue there is being completed a gigantic duplex horizontal dredging pump for use in gold mining on the Snake river in Alaska. The Alaska Machinery Company is the owner and H. B Buddenborg the designer.

Butte, Mont.—Work has commenced on a car line from Columbia Gardens to the city by the Butte Street Railway Company.

Bellingham, Wash.—The Sunset Telephone Company will place in operation a new long distance line to Seattle.

Tocoma, Wash.—The Tocoma Railway and Power Company is double tracking its spanway line and will also double track the Sixth avenue line from St. Helena avenue to E street.

Walla Walla, Wash.—The Northwestern Gas and Electric Company plant was damaged $60,000 by the recent flood.

Vancouver, B. C.—A telephone systems from ocean to ocean will be constructed by the Grand Trunk Pacific, according to news received here from Montreal.

West Seattle, Wash.—The West Seattle City Council declared that no exclusive street railway franchise would be granted in that place.

Washington, D. C.—The naval appropriation bill reported to the Senate carries three amendments, for the Puget Sound navy yard; $60,000 for a central power plant; $25,000 for outbuildings and $1,500 for extension of the telephone system. The bill also carries $65,000 for the extension of a wireless telegraph system along the coasts of Washington, Oregon and California.

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They contain every article necessary to antiseptically dress a cut, burn or wound of any kind, received in office, factory or store and prevent blood poisoning or serious complications which frequently result from delay. Also include well known remedies for relief of simple complaints often preventing loss of time. Medicines and dressings are conveniently arranged and instantly get-at-able. The price of the case is only $7.00, which is the retail value of the articles it contains.

SENT ON 60 DAYS TRIAL

If at the expiration of that time you are **not satisfied** that the cabinet is worth the price **($7.00) to** you, return at our expense.

THE ACCIDENT CABINET CO., Kalamazoo, Mich.
Send us one of your Emergency Accident Cabinets on 60 days' trial. If satisfied with it we will remit $7.00 at expiration of that time, if not will return cabinet.

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Town and State_____

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Cor. of Steuart and Folsom Sts.
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